

The National Semiconductor® WebPAD™ Device and QNX

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Agenda

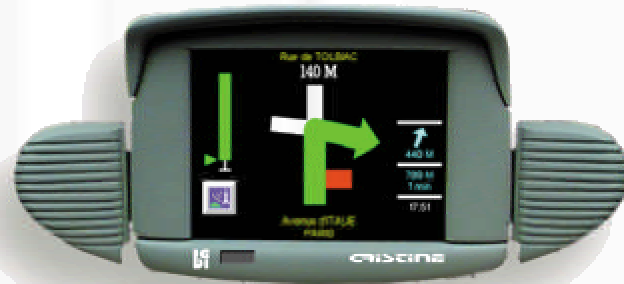
- Trends in the consumer space
- Home networking
- Competing/synergistic networking technologies
- Consumer requirements/user experience
- Evolution/likely patterns
- Key considerations for manufacturers

The E-device Era is Dawning

- Market for e-devices is exploding !
 - From \$2.4 B to \$17.8 B in next 4 years*
 - IDC Report by Paul G Schreier, April 2000
 - More information appliances than PCs by 2002
 - e-devices will place new demands on embedded systems -- the new standards are not yet defined
 - there is NO dominant player
 - The success of an e-device is measured by its pervasiveness
 - Interconnectivity is critical



Trends In Consumer Devices



Trends: Pervasive Data Access



What do Consumers Want?

- Traditional appliance reliability, ease of use and simplicity
- Full Internet Functionality
- Rich multi-media including audio and video
- Fast 3D Games - distributed gaming
- Pervasive information access and control
- Natural real-time interfaces - voice, gesture, pen
- Smart Home automation
- Low cost -- and/or low cost incremental add-on

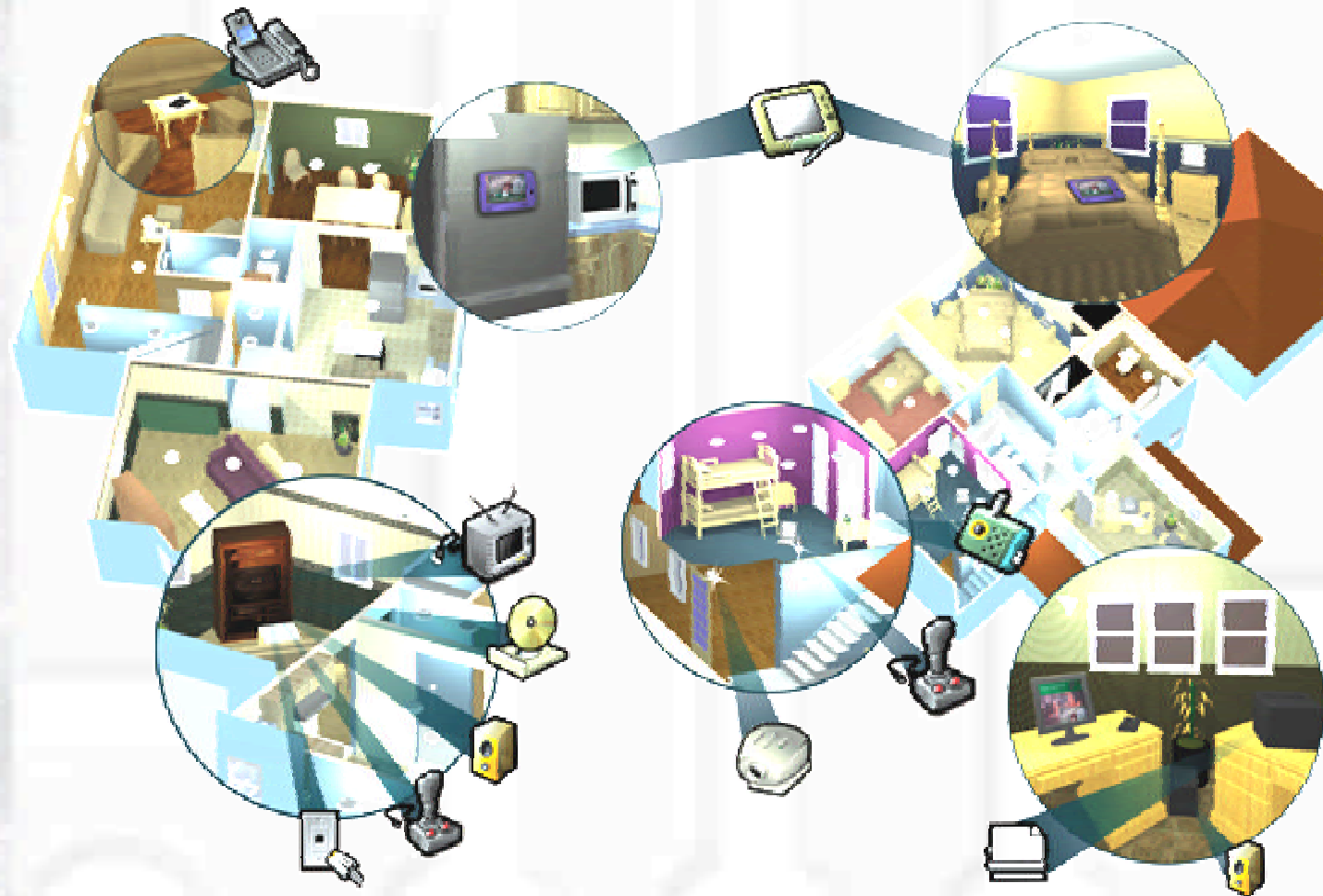


Appliances networked seamlessly & on-the-fly!

Home-based Information Appliances

- The right *user experience* will dictate pervasiveness of a device
- Pervasiveness of devices will dictate the standards that emerge
 - Bluetooth™ / WAP already in cell phones
 - HAVi push
 - HomePNA
- Early successes will be a telling factor

The Connected Home



Devices everywhere interacting seamlessly...

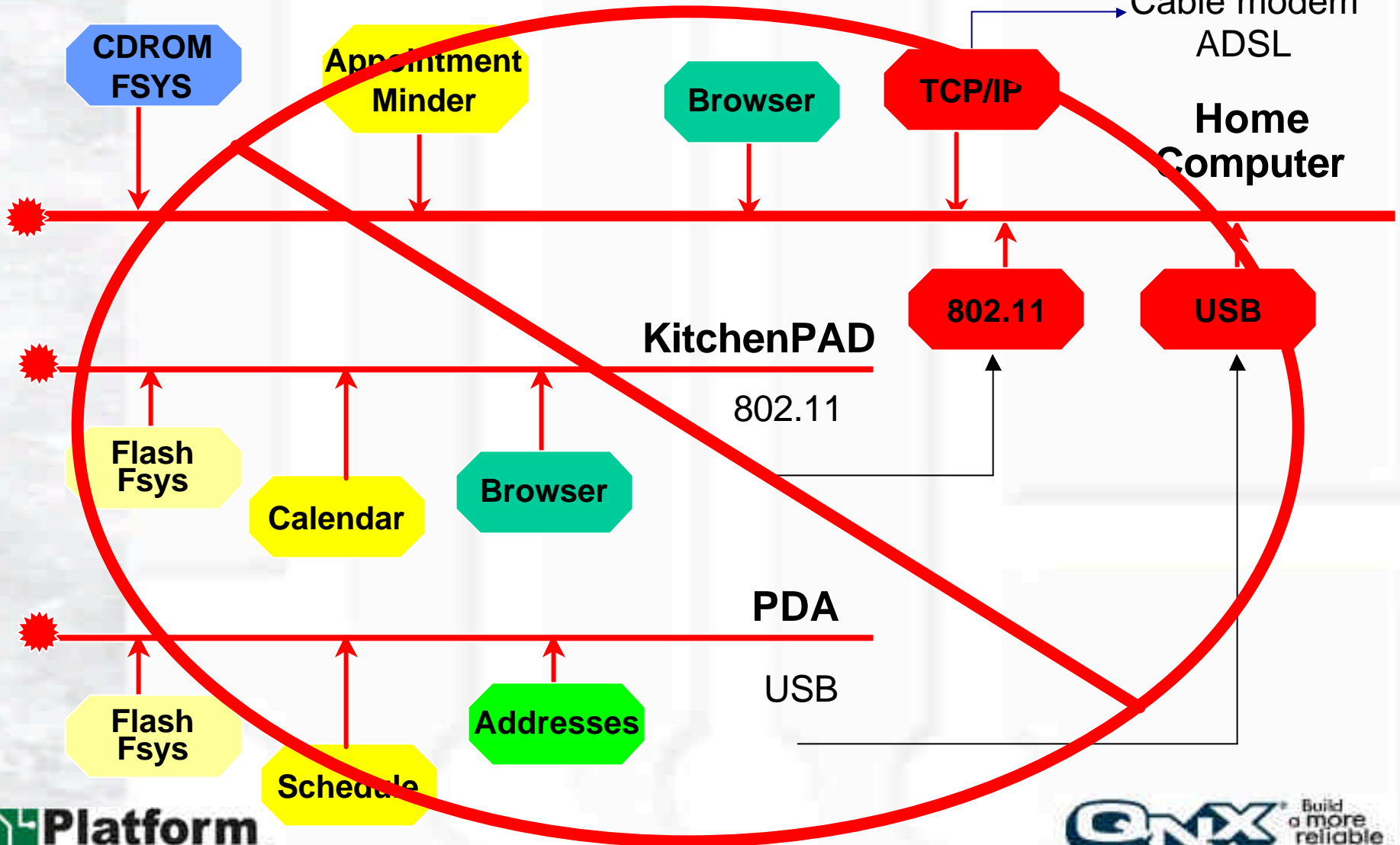
We don't want this again! :-)



Home Network

V90 modem
Cable modem
ADSL

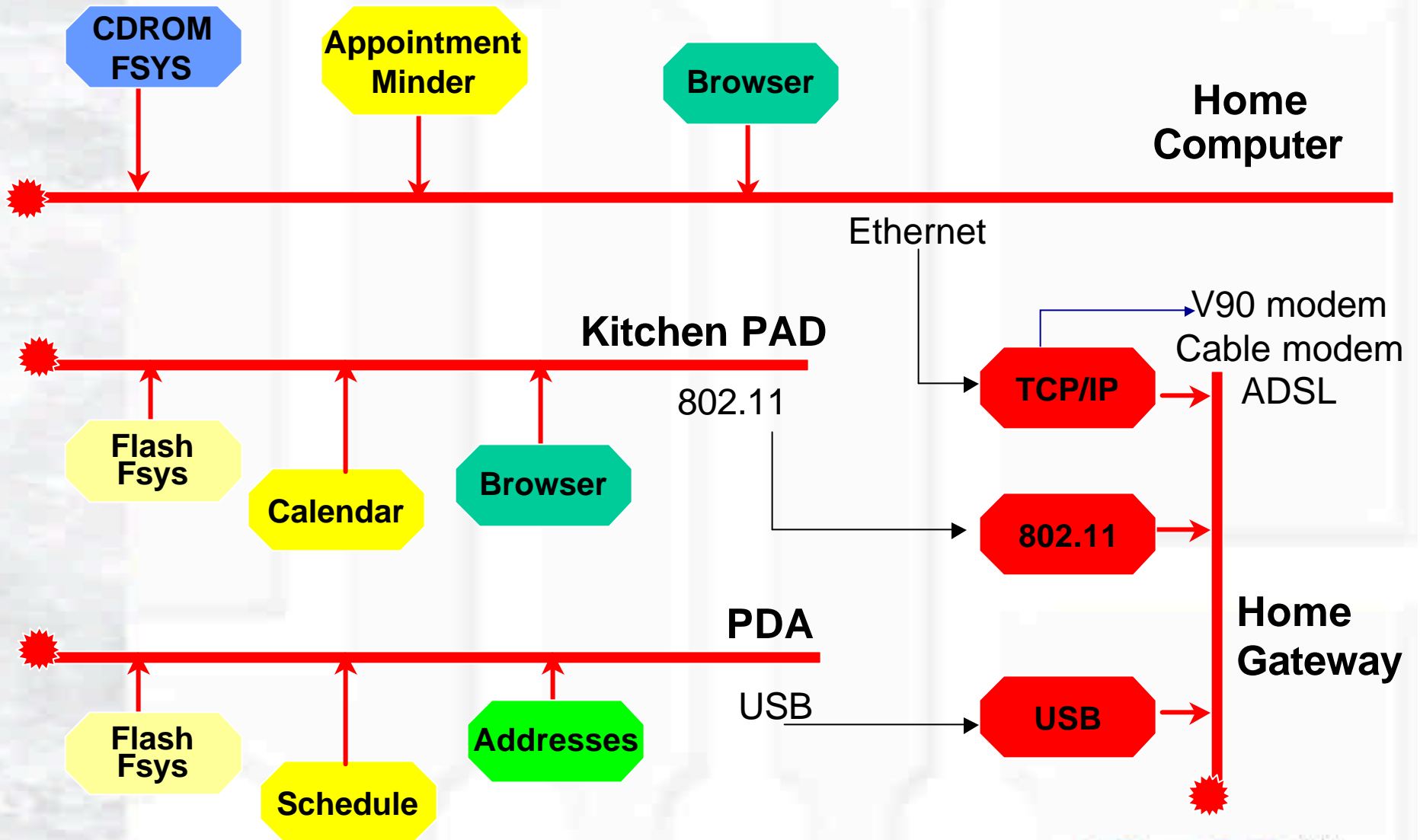
Home
Computer



***The whole of the home
network must be more than
the sum of its parts!***

***Success will drive consumer
demand***

Home Network



A Dilemma for manufacturers

- What will emerge as the standard?
- Will Jini be the play given the competition from Bluetooth™ UPnP?
- Will it be a combination?
- Manufacturers need an appropriate solution while addressing customer needs
 - customers don't care what the communication mechanism is
 - plug it in and it works

Logical and Physical Connectivity Contenders

Protocols

- Jini
- HomePNA
- HAVi
- Bluetooth™
- WAP
- X10
- Lonworks

Physical

- Electrical
- POTS
- Wireless (RF, 802.11)
- Ethernet

HomePNA

- Currently 1 Mbit/s, moving to 10 Mbit/s to 100 Mbit/s
- Phone line transport
 - wiring not shared outside the home, ensuring security
 - does not interrupt existing phone service
- Frequency division multiplexing (FDM)
- Complement to power line and RF
- HAVi competitor

Home Audio Video Interoperability (HAVi)

- Based on, but not limited to 1394
- Data rates 100/200/400 Mbps (future 3.2GB)
- Locate and discover mechanisms
- Security protection
- Supports Device Control Modules, Applications Modules in Java (“havlets”)
- HomePNA competitor

Bluetooth^(TM)

- Personal area wireless communications
 - short range radio frequency (10 meters)
 - higher power for home area
 - great for mobile devices joining a home network
 - bandwidth is low (1 Mbps)
- Alternative to fixed networks
- Fast ACK and frequency hopping
- Minimizes impact of microwave
- Service discovery protocol

Jini

- Ability to form impromptu networks
- Service lookup, discovery and marshalling protocol
- Registered devices and services
- Automatic discovery of new devices and services
- Java Remote Method Invocation (RMI™)
- Devices add/removed on the fly
- JVM overhead

Myriad Devices

- Stereo equipment
- TV
- Phone
- Electrical equipment
- Security
- Automobile
- PDAs & cellular phones

The ultimate is to bring all of these devices together in a single homogeneous network, so they can leverage their combined power and features

What do Manufacturers need?

- Rapid swapping of losing protocols for the winners.
- A comprehensive one-stop software solution
- Customers happy that products “just work.”
- Software Architecture makes it happen.

Need to cover the field

- Manufacturers can't back just one horse and hope it wins.
- Also can't implement everything into every device.
- The home gateway can help.....

The connected home



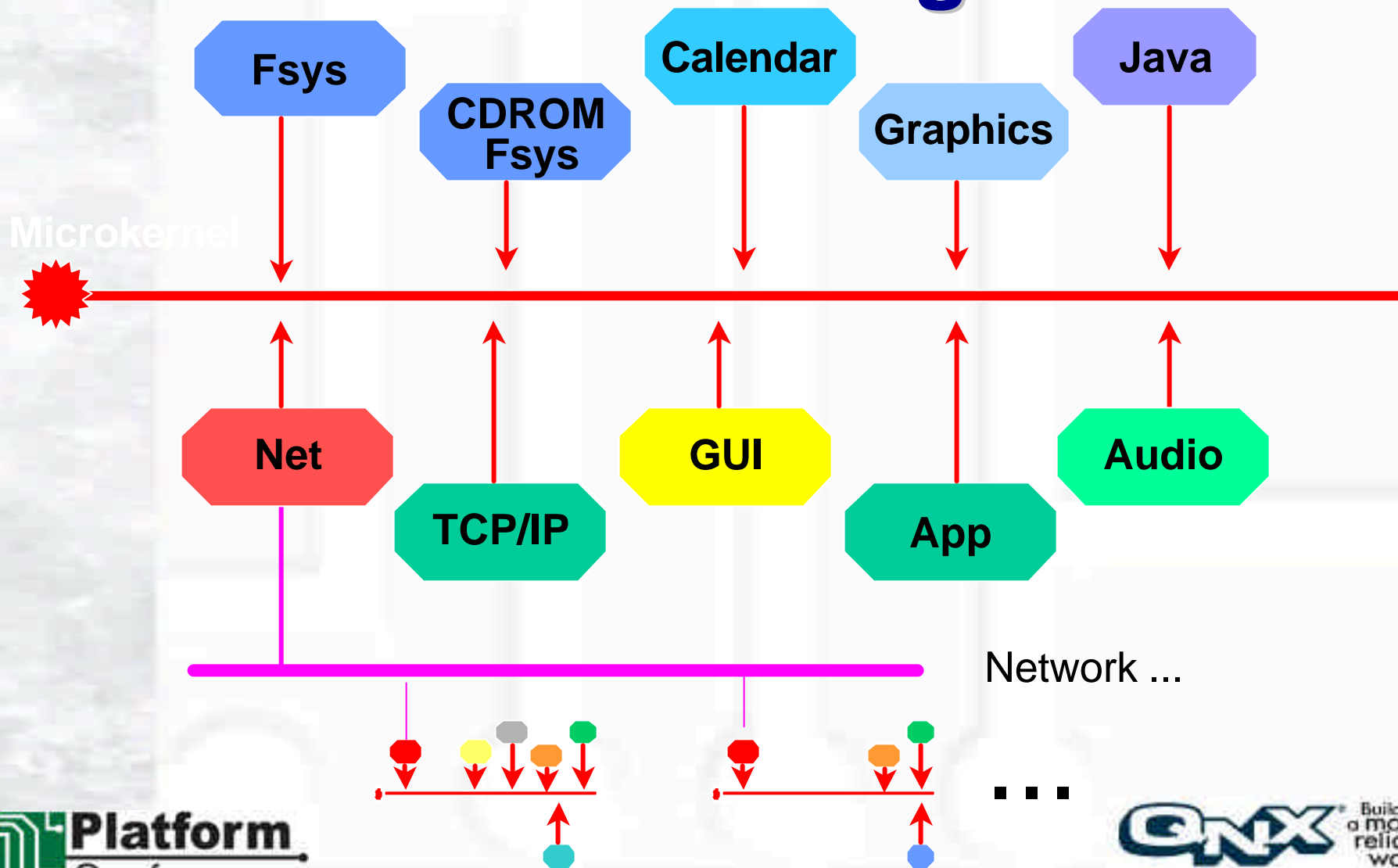
Practical?

- How can a HAVi device access a Bluetooth™ device?
- Some serious inter-protocol mapping would have to occur.
- A difficult scenario
- What about *transparent networking*?

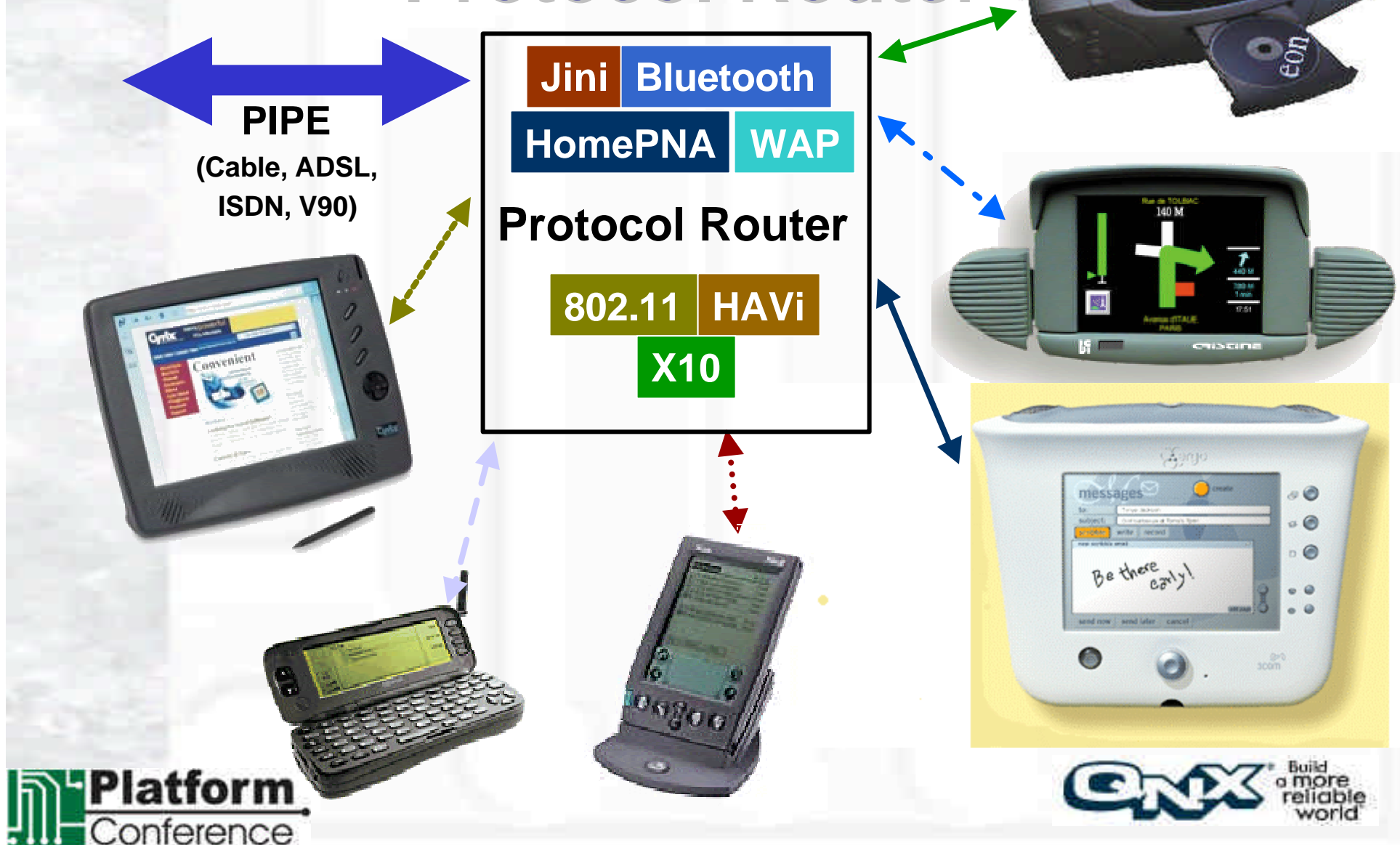
Transparent Networking

- Network looks like a homogeneous set of resources
- Resources anywhere on the network can be accessed by any machine
- Performs much of what Jini, Bluetooth™ are designed to do
- This also applies to protocol gateways

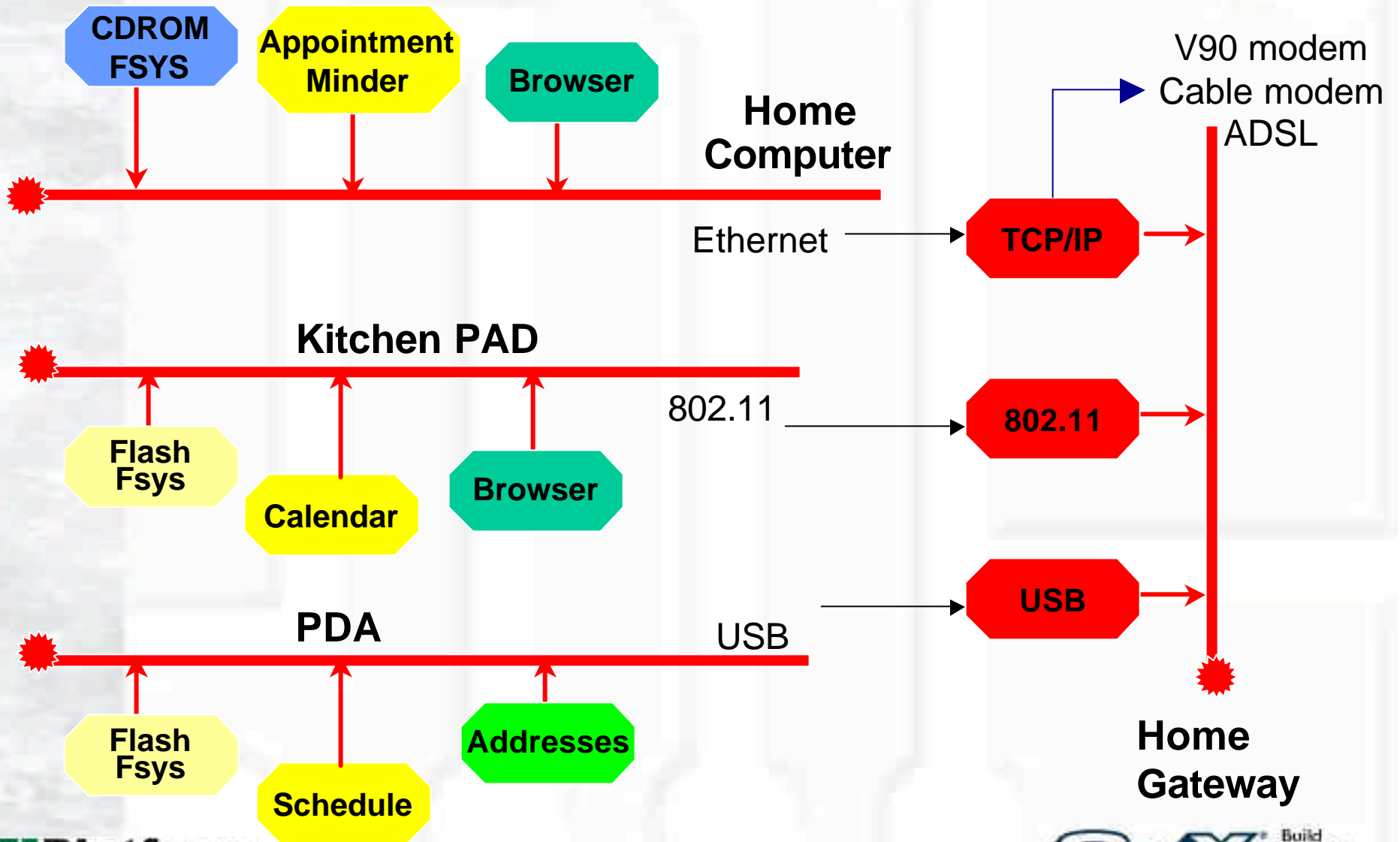
Transparent Distributed Networking



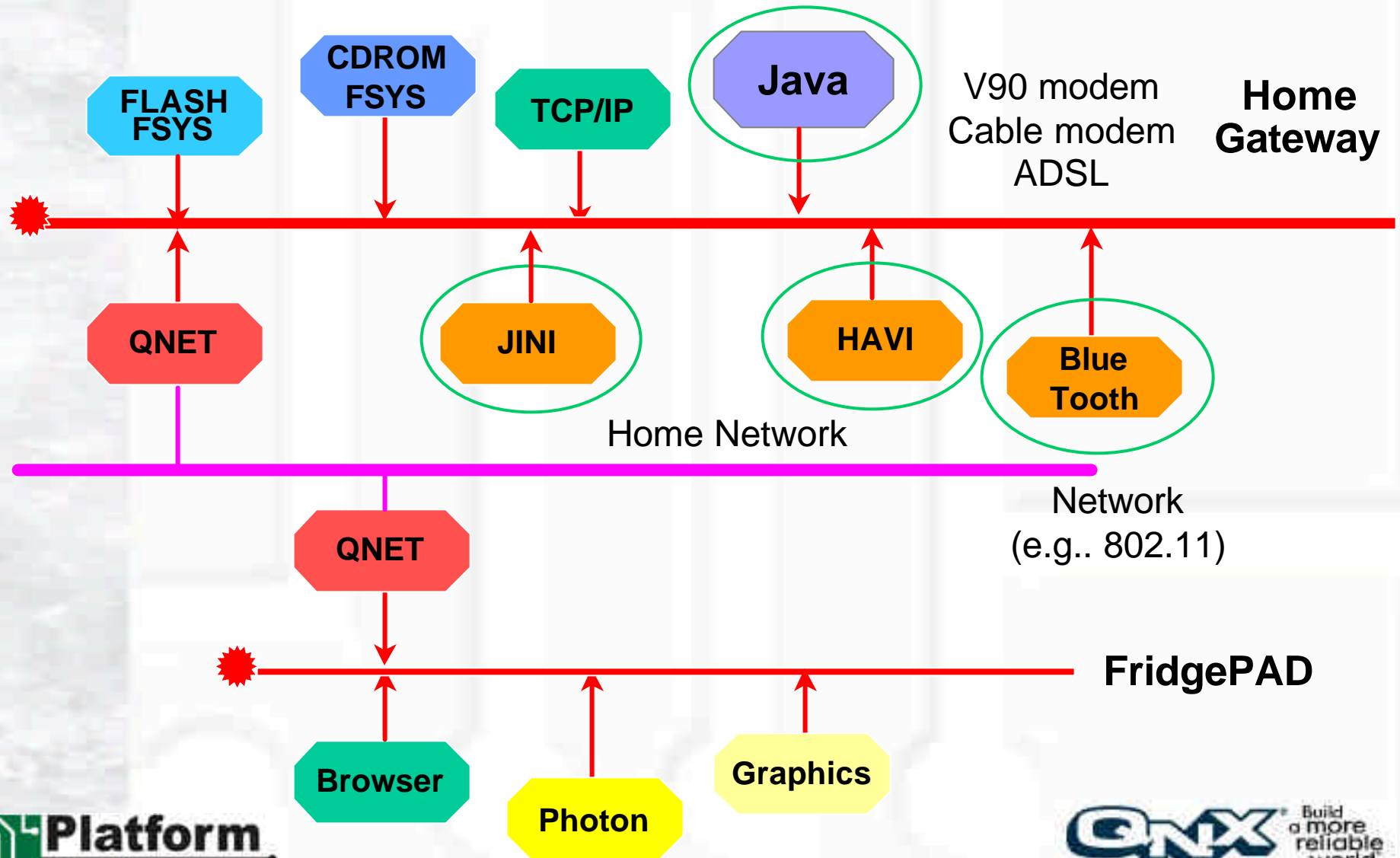
Home Gateway = Protocol Router



Home Network



Home Network



QNX Solutions

- Transparent networking
- Many communication protocols
- Support for multiple processor architectures
- Software architecture to bring all the pieces together



Realtime Platform